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REMARKS—General

Applicants thank the Examiner for the clear and understandable Office Action. Applicants acknowledge the allowance of claims 114 and 115 with appreciation. By the above amendment, Applicants have amended the rejected and objected to claims to define the invention more particularly and distinctly so as to overcome technical rejections and define the invention patentably over prior art.

Objections to Claims 6-12, 19, 21-34

Claims 6-12, 19, 21-34 were objected to in the O.A. as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form, including all of the limitations of the base claim and any intervening claims.

Applicants have rewritten the claims 6-10, 12, 19, 21, 29, 34 in independent form, including all of the limitations of the base claim and any intervening claims. Applications left claims 11, 22-28, 30-33 in their original dependent form because these claims depend on the amended base claims rewritten in independent form. Applicants respectfully request the Examiner to allow these dependent claims if the base claims rewritten in this amendment are allowed.

When rewriting claim 21, applicants made a change to one of the limitations of the claim. The original claim stated "the application controllers include distribution management logic...". The currently amended claim states "at least one application controller includes distribution management logic...". Applicants submit that this amendment to claim is supported by the specification and respectfully request Examiner to allow this amendment.

Objections to Claims 2, 5, 34

Claims 2, 5, 34 were objected to in the O.A. under CFR 1.75(c) as being of improper dependent form for failing to further limit the subject matter of a previous claim. Per Examiner's suggestion, applicants have rewritten the objected to claims in independent form.

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Rejection of Claims 13, 17, 20 Under 35 USC § 112

Claims 13, 17, 20 were rejected under § 112. Applicants have amended the claims to overcome the Examiner's objections.

Rejection of Claims 1, 2, 4, 5, 74 Under 35 USC § 102

Claims 1, 2, 4, 5, 74 were rejected under § 102(e) as being anticipated by Chandra et al. (USPN 6594779B1). Applicants have amended the rejected claims to define parentably over this reference.

The Reference and Differences of the Present Invention Thereover

Prior to discussing the claims and the amendment to the rejected claims, applicants will first discuss the reference and the general novelty of the present invention and its unobviousness over the reference.

Chandra et al. describes a system for checkpointing a restarting resources that includes a cluster manager, resource managers, and resources. According to the reference, the cluster manager has the responsibility of maintaining the availability of the resources and ensuring that the resources provide the desired quality of service (column 5, lines 64-67). Further, the cluster manager is responsible for starting (the reference uses the term "onlining"), stopping ("offlining" in the reference) and restarting resources (column 9, lines 4-9). The cluster manager makes the determination on which node each resource is started and/or restarted (column 6, lines 22-27). The determination of how resources are distributed and redistributed after a failure is made by logic internal to the cluster manager and could be influenced by policies (column 6, lines 14-27). However, it appears that the cluster manager cannot be configured to distribute resources differently than it is supported by the cluster manager's internal logic—the only algorithm that could be used to determine how resources are distributed is "hard-coded" into the cluster manager's internal logic.

This inflexibility of how applications could be distributed makes a system according to the reference unsuitable for executing many types of distributed applications. For example, the reference does not explain how the following types of distributed applications could be supported on a system: (Applicants use the term "execution model")

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to refer to a concept that includes the determination of how applications are distributed and redistributed.)

- 1) The reference does not explain how to determine distribution of applications with a multi-level execution model, such as the distribution of Java 2, Enterprise Edition (J2EE) applications. J2EE applications are comprised of containers and execution modules, such that execution modules are created in containers. In general, a system that supports J2EE applications has to make determination how many containers to start and on which nodes; and how many execution modules to create and in which containers. The reference does not explain how a cluster manager could be configured to determine distribution of multi-level resources, or how a system would accomplish multi-level distribution in some other way.
- 2) The reference does not explain how to determine the distribution of applications requiring complex application-specific distribution strategies, such as high-availability telecommunication applications. A distribution strategy is called application-specific if applications themselves are involved in determining how applications are distributed. The reference does not explain how a cluster manager would interact with applications to determine applications' distributions, or how a system would accomplish application-specific distribution in some other way.
- 3) The reference does not explain how to support multiple applications with multiple different execution models executing concurrently on a system. For example, the reference does not explain how to support—on the same system and the same time—a J2EE application and a telecommunication application. The reference supports only applications with a single execution model, which is the execution model supported by the cluster manager.
- 4) In general, only the vendor of the cluster manager software can enhance the cluster manager to support a new type of applications with an execution model that is not currently supported by the cluster manager, whereas a customer using the cluster manager cannot modify it. This makes it impossible for a customer to execute applications for which the vendor has not provided execution model support.

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In particular, Chandra et al Does Not Explain How A System Could Determine Distribution of Applications with Multiple Different Execution Models.

The specification of the present invention explains how a system according to the present invention overcomes the above-identified shortcomings of the referenced and other prior art. It does so by separating the logic corresponding to a cluster manager described in the references into two parts: an execution controller and at least one application controller. An execution controller includes the control logic and state information that are common to most execution models, such as status and availability of nodes and processes, and the definition of node groups. An application controller includes the control logic that is specific to a particular execution model. The present invention describes in detail the functionality of an execution controller and application controller; the interfaces and interaction between an execution controller and an application controller used in some embodiments of the invention; and two different exemplary application controllers for managing and determining distribution of applications with two dissimilar execution models. Novel aspects of the present invention overcome the above-identified shortcomings of Chandra et al:

- 1) The specification illustrates how a system could be configured to support applications with multi-level execution models, such as J2EE applications, by providing a detailed description of the Java Application Controller used in one embodiment of the invention.
- 2) The specification explains how a system according to the present invention could be configured to support applications requiring complex application-specific distribution strategies, such as high-availability telecommunication applications.
- 3) The specification describes how a system configured with an execution controller and multiple applications controllers can support applications with multiple different execution models.
- 4) In some embodiments of the invention, a customer can extend the capabilities of a system by adding new application controllers. A new application controller could be developed by a customer, the vendor of the execution controller, or by a third-party vendor. This aspect of the invention provides customers with greater

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flexibility and allows them to execute a larger number of different applications than on a system according to the reference.

Applicants have amended claims 1,2,4,5,74 by adding a limitation stating that application controllers determine how applications are distributed. As the amended claims include also a limitation of including a plurality of application controllers supporting different execution models, the amended claims distinguish over Chandra et al because the claims describe how to distribute applications with multiple different execution models, which Chandra et al does not explain.

Amended Claims 1,2,4,5,74 Distinguish Over Chandra et al Under Section 102 because Chandra et al Does Not Explain how Distribution of Applications With Multiple Different Execution Models Is Determined.

The Novel Physical Features of Amended Claims 1,2,4,5,74 Produce New and Unexpected Results and Hence Are Unobvious and Patentable Over Chandra et al Under Section 103. The new and unexpected results include ability to run multiple applications with multiple different execution models; multi-level applications; and applications with complex application-specific distribution strategies. Further, another new and unexpected result is that customers can extend the capabilities of a system by adding new application controllers.

Rejection of Claims 14-18

The "Disposition of Claims" section on the O.A. summary page lists claims 14-18 as rejected. However, the O.A. detail action does not include the reasons for their rejection.

Applicants made the assumption that these claims have been rejected as being dependent on rejected base claims. As applicants amended the rejected base claims in this amendment, they respectfully request the Examiner to consider claims 14-18 for allowance.

Office Action Does Not Indicate Disposition of Claim 3

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The O.A. does not indicate the status of claim 3. Applicants have amended claim 3 to be in a proper form. Applicants respectfully request the Examiner to consider claim 3 for allowance.

Cancellation of Claims 75-97

Applicants cancelled claims 75-97 in order to keep the same number of independent claims in the amended application as in the original applications.

CONCLUSION

For all the above reasons, applicants submit that the amended claims are now in proper form, and that the claims all define patentably over prior art. Therefore, they submit that this application is now in condition for allowance, which action they respectfully solicit.

Conditional Request for Constructive Assistance

Applicants have amended the claims of this application so that they are proper and define novel structure which is also unobvious. If for any reason this application is not believed to be in full condition for allowance, applicants respectfully request the constructive assistance and suggestions of the Examiner pursuant to M.P.E.P. § 2173.02 and § 707.07(j) in order that the undersigned can place this application in allowable condition as soon as possible and without the need for further proceedings.

Very respectfully,

/Vladimir Matena/

/Magnus Eriksson/

/Jens Jensen/

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Certificate of Facsimile Transmission. I certify that on the date below I will fax this paper to GAU 2113 of the U.S. Patent and Trademark Office at 571-273-8300.

2007 May 29

Vladimir Matena